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A Comprehensive PT Program Utilizing An AlterG Treadmill For A Patient With Lower Extremity Fractures And Charcot-Marie-Tooth Disease: A Case Report

Mark Whitsitt
University of New England

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Mark Whitsitt, BS, is a Doctor of Physical Therapy (DPT) student at the University of New England, 716 Stevens Ave. Portland, ME 04103

Address all correspondence to Mark Whitsitt at: mwhitsitt@une.edu

The patient signed an informed consent acknowledging the participation in this case report and allowing the use of their personal health information and recorded images. The patient received information on the university's policies regarding the Health Insurance Portability and Accountability Act.

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Background and Purpose: People with Charcot-Marie-Tooth (CMT) disease have a greater risk of falls and subsequent fractures. There is a scarcity of information regarding the most effective rehab protocol for a patient with lower extremity fractures and CMT disease. Utilization of the AlterG® has been shown to promote early mobility in patients with an orthopedic diagnosis, which is also vital for CMT patients, but has not been fully investigated. The purpose of this case report was to investigate a comprehensive physical therapy program, including use of the AlterG® treadmill, for a patient with lower extremity fractures and CMT disease.

Case Description: The patient was a 54-year-old female with CMT. A traumatic fall caused lower extremity fractures to her left talus, tibia, and fibula after which she received surgery. Upon initial evaluation, the patient demonstrated decreases in left ankle and knee passive range of motion (PROM) and strength. A comprehensive rehab program three times a week for 16 weeks included manual techniques, therapeutic exercise, and stretching. Gait training, using the AlterG® concentrated on early weight bearing and proper biomechanics.

Observations: From initial evaluation to discharge, the patient improved in PROM, strength, girth measurements and ambulatory ability. Lower Extremity Functionality Scale scores demonstrated a 67% improvement in lower extremity function. The patient progressed from partial weight bearing to full weight bearing without an assistive device. Functionally, the patient reported being able to return to work unrestricted.

Conclusion: A comprehensive physical therapy program including the early implementation of the AlterG® for a patient with multiple lower extremity fractures and CMT disease resulted in increased function and decreased reported pain.

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Background and Purpose

Charcot-Marie-Tooth (CMT) disease is a prevalent neurological condition reported to occur in approximately 1 out of every 2,500 individuals.[1] CMT is the most common neurological disease that is genetically inherited.[1] It effects the myelin sheath surrounding nerves causing muscle insufficiencies, drop foot, lack of touch sensation, and cavus foot.[1] As a result of these impairments, patients often have a change in gait patterns. Research has found that CMT patients have a 1.5-fold increase in risk of obtaining a fracture in the foot, ankle, or hand.[2] This has been speculated to be a result of initial manifestation that begins in the feet, ultimately causing a fall.[2]

Lower extremity fractures are also a common event encompassing about 27% of the total caseload of orthopedic surgeons.[3] These fractures are a debilitating event and can have a large negative effect on the patient's physical health and daily activities for up to 6 months.[4] Despite their regular occurrence and negative effects, studies regarding protocols for recovery of tibia shaft fractures, without severe comorbidities, vary in opinion and results.[5] Further, there is a paucity of research regarding physical rehabilitation protocols of those who have sustained lower extremity fractures and also have the neurological condition of CMT.

Use of the AlterG® Anti-Gravity Treadmill (AlterG® Inc., Freemont CA) has increased in popularity for rehabilitation of many lower extremity conditions. Use of a positive pressure treadmill allows an individual to closely monitor and change their biomechanical environment.[6] The clinician alters the individual's total body weight that is loaded onto the treadmill. This dramatically decreases the ground reaction forces and joint forces produced within lower extremity joints.[6] A body weight supported physical activity program can be beneficial to patients with a lower extremity injury by allowing them graded exposure to the weight bearing activities as their injuries heal.[7]

While the implementation of positive pressure treadmills has been increasingly used in

the treatment of athletes and general orthopedic patients, it has not been extensively researched in those with multiple lower extremity fractures and underlying condition of CMT. There are also no known studies demonstrating a protocol for the rehabilitation of a patient who has sustained multiple lower extremity fractures and has CMT. The purpose of this case report was to observe the recovery of a patient with multiple lower extremity fractures and an underlying condition of CMT while using implementation of a positive pressure treadmill.

Patient History and Systems Review

The patient offered written consent to participate in this case report. The patient was a 54-year-old female who presented to an outpatient therapy clinic. She experienced a traumatic fall while at work approximately one month prior to initial evaluation. The fall caused the patient to fracture her left tibia, fibula, and talus. While hospitalized, she received an open reduction internal fixation (ORIF) surgery to repair her left leg. Surgery included one rod extending the full length of her tibia and fibula with no hardware needed to stabilize the talus. She was seen for a follow up appointment two weeks after surgery and was cleared to begin physical therapy two weeks later. A gross assessment was performed at initial evaluation. Limitations included impairments in left ankle range of motion, strength, and sensory function. A systems review revealed that she experienced limitations in balance and mobility. A complete summary of the performed systems review can be found in Table 1.

The patient's recovery was complicated by Charcot-Marie-Tooth disease (CMT). CMT affected motor and sensory function of both her feet causing bilateral foot drop and an impaired gait cycle. She received the CMT diagnosis approximately 30 years prior. The patient reported no further medical complications and was in relatively good health. She was unrestricted in her daily activities before the fall. The patient worked as a school teacher and had a very supportive family to aid in her recovery and attendance of physical therapy. The patient used the assistance

of crutches to walk and was not able to bear full weight on her left leg. She did not present with ankle foot orthotics for her bilateral foot drop. Her goals for therapy were to reduce her level of pain and return to work without restrictions.

Clinical Impression 1

The patient's primary problems included impaired range of motion, strength, sensation of her left knee, ankle, and toes. Other primary problems included impaired balance and gait, increased pain levels, and decreased ability to perform activities of daily living. Impairments related to Charcot-Marie-Tooth disease (CMT) were present for about 30 years. No differential diagnosis was required for this case. The following plan for examination included administration of a Lower Extremity Functionality Scale (LEFS), Numeric Pain Rating Scale (NPRS), and gait assessment. This patient was a good candidate for this case report due to her very high motivation to return to independence, rarely observed comorbidity of CMT, and likely benefit from utilization of the AlterG® treadmill. (AlterG® Inc., Freemont CA).

Examination – Tests and Measures

The patient was administered the Lower Extremity Functionality Scale (LEFS) while she was in the waiting room. The LEFS has been a widely chosen tool for the assessment of many different conditions of the lower extremities.[8] The LEFS involves many questions regarding daily tasks that involve lower extremities. The LEFS is a self reported questionnaire where scores are totaled to find a numerical disability percentage. This test is quick and easy to administer and score. Its use helps practitioners in determining independence and capability of the patient. It has been found to be reliable, valid, and responsive for the general patient population.[8]

The patient was also administered the Numeric Pain Rating Scale (NPRS) to assess severity of pain. This tool allows the administrator to question the patient on the severity of their

pain with the patient self-reporting a number from zero to ten. Ten is the worst amount of pain and zero is the least. This test was chosen based upon its high responsiveness in detecting changes in pain intensity and validity for numerous patient populations.[9] Current pain levels were further assessed upon every visit to determine pain.

The patient was initial observed using observational gait analysis. Although this tool does not have high validity or reliability, clinically it often used to observe large deviations in gait kinematics.[10] As she ambulated to the treatment area her gait involved excessive hip flexion and knee extension to accommodate for a foot drop bilaterally. The patient was grossly assessed for impairments in range of motion, sensation, strength, motor function, and balance through her reported history and observed findings. More objective measures of girth, goniometry, manual muscle testing, and reflex testing were performed with results listed in Table 2. Girth testing has been shown to be reliable in detecting circumferential differences in the lower extremity.[11] Goniometry is moderately reliable if assessed by the same therapist.[12] Manual muscle testing, however, is not a very reliable tool but can be useful in a clinical setting for determining strength.[13] Reflex testing was performed as a valid and reliable tool to confirm the presence of CMT and foot drop.[14] No active ankle range of motion was observed bilaterally due to the patient's CMT. No further tests were performed due to the sensitivity of the patient and lack of need for a differential diagnosis.

Clinical Impression 2

The patient's presentation was consistent with an open reduction internal fixation (ORIF) of the left tibia and fibula and a talus fracture. This was determined based upon surgical and physical therapy examination which consisted of objective goniometry measurements, strength findings, disability index obtained from the LEFS, NPRS current levels of pain, and girth measurements performed during examination. The patient continued to be an excellent candidate

for physical therapy and the case report according to her prior level of function, high motivation, likelihood of recovery, and general good health condition. An area that may have decreased her likelihood for a positive prognosis was her 30-year history of CMT. The patients overall progress remained satisfactory.

The main physical therapy diagnoses included impaired balance/ambulation, pain levels, and lower extremity strength. The selected ICD 10 codes for this case included S82.112F displaced fracture of left tibial spine, subsequent encounter for open fracture (type IIIA, IIIB or IIIC) with routine healing, R26.2 difficulties in walking, not elsewhere classified, and M79.605 pain in left leg. Rehabilitation potential of the patient was excellent. She was highly motivated with a strong support system in her family. She had no reported comorbidities that would affect the rate of bone healing. Overall research for complete healing rates of CMT patients with ORIF injuries of the tibia was lacking. Estimated rates for fracture union in non CMT patients were between 19 and 25 weeks.[15] The patient's estimated length for skilled services was 2 to 3 weekly visits for 1 month. At 1 month, reassessment was planned with administration of the NPRS, observational gait analysis, and both goniometric and strength measurements. At initial evaluation, it was hypothesized that the patient may require a longer amount of time to return to unimpaired ambulation due to her abnormal gait cycle. The patient continued to follow up with her surgeon. No further health provider referrals or consultations were needed at the time. Follow up of the patient's progress was planned to be assessed before any subsequent appointments with her surgeon and at discharge. Planned interventions for this patient included stretching,[16] manual therapy,[17] gait re-education using the AlterG® anti-gravity treadmill (AlterG® Inc., Freemont CA),[17] and therapeutic exercises adhering to weight bearing restrictions.[18,19] A summary of the patient's short term and long-term goals can be found in Table 3.

Intervention

Coordination, Communication, Documentation, Patient Instruction:

Coordination regarding the patient's evaluation and plan of care was planned with clinic staff. Further communication was made between the clinic's administrational staff and the patient's referring physician. Communication included the initial written evaluation, progress notes, and discharge notes. All documentation from the initial evaluation and subsequent visits was recorded using an electronic medical records system. The patient was instructed on a home exercise program, with a printed copy of instructions that described home techniques for managing swelling and pain. This included a compression sleeve and intermittent icing.

Procedural Interventions

The patient's plan of care consisted of 3 therapy sessions per week for a duration of 4 weeks. Interventions for the patient included stretching,[16] manual therapy,[17] gait re-education using the AlterG® anti-gravity treadmill (AlterG® Inc., Freemont CA),[18] and therapeutic exercises adhering to weight bearing restrictions.[19,20] A comprehensive description of all therapeutic exercises and their implementation can be found in Table 4 and Table 5. The patient's therapy began with the use of electric stimulation to reduce pain.[21] Stretching was added to help increase ankle range of motion and extensibility.[16] Manual therapy, in the form of an effleurage massage, was utilized to decrease swelling at the foot, ankle, and lower leg. Although research is inconclusive in the use of this intervention, a measurable difference in circumferential measurements was found post treatment. A deep tissue massage was used at the patient's calf to decrease stiffness and increase range of motion of the ankle as needed.[17] Both forms of massage proved to be particularly important due to the lack of voluntary motion that could be produced at the ankle. An initiation of weight bearing exercises began at one month post-surgery. Some studies have pointed to a beneficial pattern of healing with the addition of

weight bearing on lower extremity fractures.[5] Use of the AlterG® treadmill (AlterG® Inc., Freemont CA) was added to allow the patient to begin the functional activity of walking while maintaining relatively low levels of weight bearing.[18] Studies regarding CMT and the use of positive pressure treadmills is scarce, however, there was support of the use of positive pressure treadmills to decrease joint force while ambulating.[6,7] This allowed the patient to engage in functional activities sooner for her work. Therapeutic exercises were also given to improve lower extremity strength while adhering to a limited weight bearing status.[19,20] As the patient's condition improved, alterations in duration and intensity of each intervention were made. Therapeutic exercises were also added or removed from the patient's regimen as improvements occurred. The patient was compliant with her home exercise program regarding techniques for decreasing swelling. The patient attended all scheduled therapy sessions and received no co-intervention treatments.

Outcome

The patient achieved all long-term and short-term goals as listed in Table 3. From initial evaluation to discharge, the patient improved in all areas of passive range of motion, strength, girth measurements, and ambulatory ability. LEFS scores improved from to 10/80 to 64/80 at discharge, which demonstrated a 67% improvement in lower extremity function. Left ankle dorsiflexion increased from 0º to 8º and left knee flexion increased from 90º to 110º. Muscle testing revealed an increase in left knee strength from -2/5 to 4/5 at discharge. Girth measurements at the malleoli improved from 22 cm to 20 cm. The patient progressed from partial weight bearing with crutches to full weight bearing without an assistive device, and was able to ambulate without a limp. The patient experienced pain during palpation along the medial and lateral ankle. NPRS scores improved from a 5/10 at initial evaluation to a 2/10 with activity at discharge. Comprehensive outcomes are listed in Table 2.

Functionally, the patient reported being able to return to work as a teacher without restriction. Small levels of discomfort persisted with increased standing or walking. Although the patient returned to a full functioning status, her return was delayed due to a stall in bone healing.

Discussion

Previous studies have observed the relationship between CMT and the risk of falls. These falls can often lead to adverse outcomes, such as fractures. While there is a positive correlation between patients with CMT disease sustaining a fracture through a fall, there is little research investigating the most effective rehabilitation protocol for these patients. Likewise, there are limited interventions that allow for early functional movement in the patient with multiple lower extremity fractures and CMT. The AlterG® has been shown to be effective in the orthopedic population, but its investigation in those with CMT is limited.[6,7] The utilization of the AlterG® was vital in allowing the patient in this case report to begin walking in a controlled environment with decreased pain. Within one month of treatment using the AlterG® began, the patient was comfortable returning to limited work that involved walking, standing, and cleaning. Her readiness to return to work may be attributed to the prescribed comprehensive physical therapy plan that included more traditional treatments such as stretching, strengthening, and massage as well as the implementation use of the AlterG® treadmill. The comprehensive program allowed the patient to tolerate full time work without restriction at discharge.

Based on the outcomes measures previously described, the patient appeared to improve from the provided plan of care. These findings suggest that those patients with CMT who have sustained multiple lower extremity fractures may benefit from a comprehensive physical therapy treatment that includes the implementation of the AlterG® treadmill. This finding is consistent with existing theories in current research. A 2015 study highlighted the effectiveness of body weight supported systems to help patients with knee osteoarthritis ambulate on a treadmill with

significant decreases in acute pain by decreasing joint forces that in turn decrease compressive joint pain.[6,7] The decreases in acute pain were consistent with the findings of the patient highlighted in this case report.

According to the patient's physician, she experienced a delay in bone healing 8 weeks after treatment as a result of her CMT. The implementation of the AlterG® treadmill and physical therapy was not viewed as an impedance in the healing process. Precautions and correct screening may be important in deciding whether a patient may experience adverse healing times while using this treatment.

In conclusion, a comprehensive physical therapy program including the early implementation of the AlterG® for a patient with multiple lower extremity fractures and CMT disease resulted in increased function and decreased reported pain. Future research should investigate the use of positive pressure treadmills as part of a comprehensive physical therapy program for those patients with fractures and neurologic comorbidities. Additional research may also investigate any relationship between the use of the AlterG® in decreasing future fall risk for at risk populations.

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Tables and Figures

Table 1. Systems Review

Systems Review	
Cardiovascular/Pulmonary	**Unimpaired**
Musculoskeletal	**Impaired:** Range of motion of right and left ankle and toes Strength of left knee, bilateral ankles, bilateral toes Gait due to CMT and use of crutches
Neuromuscular	**Impaired:** Tone diminished in bilateral lower extremities below the knee Sensation diminished in bilateral lower extremities below the knee Balance due to touch down weight bearing status
Integumentary	**Impaired:** Multiple healing incisions of the left lower extremity Swelling of left ankle and foot
Communication	**Unimpaired**
Affect, Cognition, Language, Learning Style	Bright affect, unimpaired cognition, English language, preferred demonstrations

317 Table 2. Tests and Measures

Tests & Measures	Initial Evaluation Results	Re-Eval Results (One Month)	Discharge Results
Gait Assessment	Increased hip flexion bilaterally Drop foot bilaterally **Non weight bearing**	Relative decrease in hip flexion Drop foot bilaterally **100% weight bearing**	Pre-injury level of gait **100% weight bearing**
LEFS	12.5% (**10/80**)	**Not Tested**	80% (**64/80**)
NPRS (0-10)	**3/10** pain at its best **5/10** current pain **10/10** pain at its worst	**3/10** current pain **5/10** pain at its worst	**2/10** pain at its worst
Girth Testing (cm)	**Ankle Circumference** Left 22 cm Right 17 cm	**Ankle Circumference** Left 22 cm Right 17 cm	**Ankle Circumference** Left 20 cm Right 17 cm
Goniometry Testing (degrees)	**Knee AROM** **Left** **Right** Flexion 90 WNL Extension WNL WNL **Ankle AROM** **Left** **Right** **Right** Dorsiflexion 0 0 Plantarflexion 0 0 Eversion 0 0 Inversion 0 0 **Ankle PROM** **Left** **Right** Dorsiflexion 0 WNL Plantarflexion 65 WNL Eversion 20 WNL Inversion 35 WNL	**Knee AROM** **Left** **Right** Flexion 90 WNL Extension WNL WNL **Ankle AROM** **Left** **Right** Dorsiflexion 0 0 Plantarflexion 0 0 Eversion 0 0 Inversion 0 0 **Ankle PROM** **Left** **Right** Dorsiflexion 0 WNL Plantarflexion 65 WNL Eversion 20 WNL Inversion 35 WNL	**Knee AROM** **Left** **Right** Flexion 110 WNL Extension WNL WNL **Ankle AROM** **Left** **Right** Dorsiflexion 0 0 Plantarflexion 0 0 Eversion 0 0 Inversion 0 0 **Ankle PROM** **Left** **Right** Dorsiflexion 8 WNL Plantarflexion WNL WNL Eversion WNL WNL Inversion WNL WNL
Manual Muscle Testing	**Knee** **Left** **Right** Flexion -2/5 WNL Extension -2/5 WNL **Ankle** **Left** **Right**	**Knee** **Left** **Right** Flexion +3/5 WNL Extension +3/5 WNL **Ankle** **Left** **Right**	**Knee** **Left** **Right** Flexion 4/5 WNL Extension 4/5 WNL **Ankle** **Left** **Right**

	Dorsiflexion	1/5	1/5	Dorsiflexion	1/5	1/5	Dorsiflexion	1/5	1/5
	Plantarflexion	+1/5	+1/5	Plantarflexion	+1/5	+1/5	Plantarflexion	+1/5	+1/5
	Eversion	1/5	1/5	Eversion	1/5	1/5	Eversion	1/5	1/5
	Inversion	1/5	1/5	Inversion	1/5	1/5	Inversion	1/5	1/5
	Toe	**Left**	**Right**	**Toe**	**Left**	**Right**	**Toe**	**Left**	**Right**
	Extension	1/5	1/5	Extension	1/5	1/5	Extension	1/5	1/5
	Extension, great	1/5	1/5	Extension, great	1/5	1/5	Extension, great	1/5	1/5
	Toe Flexion	-2/5	-2/5	Toe Flexion	-2/5	-2/5	Toe Flexion	-2/5	-2/5
Deep Tendon Reflex Testing	**Left L3 Patellar Tendon: 3+** **Left S1 Achilles Tendon: 1+**			**Not Tested**			**Not Tested**		

AROM: Active Range of Motion, PROM: Passive Range of Motion, WNL: within normal limits

320 Table 3. Patient Goals

Short Term Goals	**Long Term Goals**
The patient will experience a pain decrease to 4/10 according to the NPRS within two weeks from the start of care.	The patient will experience a pain decrease to 3/10 according to the NPRS within four weeks from the start of care.
The patient will increase knee extensor and flexor strength to 3+/5 within two weeks from the start of care in order to prepare to return to work.	The patient will increase knee extensor and flexor strength to 4+/5 within four weeks from the start of care in order to prepare to return to work.
The patient will be able to weight bear to 50% of her body weight within two weeks from the start of care in order to prepare for gait.	The patient will be able to improve her gait to a normal and unassisted level within four weeks from the start of care in order to return to work.
	The patient will be able to return to work with minimal restrictions within four weeks from the start of care.

321

322 Table 4. Intervention Plan

Intervention	**Stage 1 Example**	**Stage 2 Example**	**Stage 3 Example**
Electric Stimulation with Ice	15 min	15 min	
Stationary Bike	10 min	10 min	10 min
Calf Stretching	3x30 sec (Slant Board)	3x30 sec (Slant Board)	3x30 sec (Slant Board)
Knee and Ankle Stretching	5x30 sec		
Total Gym Squats	3x10 Level 10	3x15 Level 10	
4-Way Hip	2x10 Orange	2x10 Orange	2x10 Orange
Seated Hamstring Curls	2x10 Yellow	3x10 Green	3x10 Green
AlterG® Treadmill Walking	5 min 70-75% BW	15 min 85-90% BW	15 min 100% BW
Trampoline Weight Shifts	2 min		
Effleurage Massage	10 min	5 min	

Soft Tissue Massage	10 min	5 min	
Push Away			3x10 Teal
Leg Press			3x10 60 lbs.

323 min: Minutes, sec: Seconds, sets x reps, BW: Body Weight

324

325 Table 5. Intervention Descriptions

Intervention	**Description**
Electric Stimulation with Ice	2 electric stimulation pads were placed at either sides of the knee. Gel ice packs (Sammons Preston, Bolingbrook IL) were placed on top of the knee and around the ankle. The Dynatron 850 (Dynatronics, Salt Lake City UT) was set to interferential current with a patient selected intensity.
Stationary Bike	The patient cycled on a stationary bike (Cybex, Medway MA) at a self-selected pace and resistance. Both feet strapped into bike pedals.
Calf Stretching	This was performed one of two ways. 1) Long sitting with a Stretch Out Strap (OPTP, Minneapolis MN) wrapped around the foot as the patient pulls to a self-selected tension, or 2) standing on a slant board (CanDo, White Plains NY) leaning forward to a self-selected tension.
Knee and Ankle Stretching	While sitting on a stability ball (Resist-A-Ball, Venice CA) with both feet on the ground, the patient gently rocked her hips forward until the knee/ankle bends to a desired threshold.
Total Gym Squats	With both feet on the total gym foot pad and lying supine on the shuttle, the patient slowly lowered the shuttle until the knees were at about 70°. The patient then pushed back into a knee extended position.
4-Way Hip	The patient stood at a self-selected distance that provided tension from a resistance band (Lifeline by Innovation, Chicago IL) which was looped around her ankle and attached to a stable anchor. The patient was allowed 2 poles (Fitter, Calgary Alberta Canada) to aide in stabilization. While facing multiple directions, the patient then slowly kicked her leg away from the anchor. Directions used were standing toward, away, left sided, and

	right sided from the anchor. (A white board surface was added onto the floor in week 3 to allow for the foot to slide.)
Seated Hamstring Curls	The patient sat at a self-selected distance that provided tension from a resistance band (Lifeline by Innovation, Chicago IL) which was looped around their ankle and attached to a stable anchor. The patient sat facing toward the anchor and then slowly flexed the knee thus pulling the band.
AlterG® Treadmill Walking	The patient donned the appropriate provided AlterG® pants (AlterG® Inc., Freemont CA). The patient was placed into the AlterG® Treadmill (AlterG® Inc., Freemont CA) opening. The housing was brought up to, and locked, at hip height. The pants were zipped into place. The treadmill was then calibrated by pressing start. The patient selected the appropriate speed and body weight percentage to allow for relatively pain free walking.
Trampoline Weight Shifts	The patient stood on top of the small trampoline (unspecified brand) with a hand rail in front of her. While grasping the hand rail the patient slowly weighted one leg and then shifted weight onto the other.
Effleurage Massage	The patient laid down in a supine position with the feet and head supported by a pillow. The practitioner provided gentle upward strokes to the patient's foot and ankle.
Soft Tissue Massage	The patient laid down in a prone position with the feet supported by a pillow. The practitioner provided self-selected pressure and massage techniques to provide muscle relief along the length of the calf.
Push Away	The patient stood perpendicular to a resistance band (Lifeline by Innovation, Chicago IL) anchored to the wall. The patient held the band with both hands to the sternum. The patient extended the elbows while not allowing for trunk rotation and immediately returned to the starting position.
Leg Press	The patient sat on the leg press machine (Cybex International Inc., Medway MA) with her feet positioned neutrally on the bar. The patient slowly extended her knees until about 5 degrees of knee flexion. The patient slowly returned back to the starting position.

APPENDICES

Appendices 1. Lower Extremity Functionality Scale

Patient Name: _____ Date: _____

Lower Extremity Functional Scale (LEFS)

We are interested in knowing whether you are having any difficulty at all with the activities listed below **because of your lower limb problem** for which you are currently seeking attention. Please provide an answer for **each** activity.

Today, *do you* or *would you* have any difficulty at all with:

	Activities	Extreme difficulty or unable to perform activity	Quite a bit of difficulty	Moderate difficulty	A little bit of difficulty	No difficulty
1.	Any of your usual work, Housework or school activities.	0	1	2	3	4
2. or	Your usual hobbies, recreational sporting activities.	0	1	2	3	4
3.	Getting into or out of the bath.	0	1	2	3	4
4.	Walking between rooms.	0	1	2	3	4
5.	Putting on your shoes or socks.	0	1	2	3	4
6.	Squatting.	0	1	2	3	4
7.	Lifting an object, like a bag of groceries from the floor.	0	1	2	3	4
8.	Performing light activities around your home.	0	1	2	3	4
9.	Performing heavy activities around your home.	0	1	2	3	4
10.	Getting into or out of a car.	0	1	2	3	4
11.	Walking 2 blocks.	0	1	2	3	4
12.	Walking a mile.	0	1	2	3	4
13.	Going up or down 10 stairs (about 1 flight of stairs).	0	1	2	3	4
14.	Standing for 1 hour.	0	1	2	3	4
15.	Sitting for 1 hour.	0	1	2	3	4
16.	Running on even ground.	0	1	2	3	4
17.	Running on uneven ground.	0	1	2	3	4
18.	Making sharp turns while running fast.	0	1	2	3	4
19.	Hopping.	0	1	2	3	4
20.	Rolling over in bed.	0	1	2	3	4
	Column Totals:					

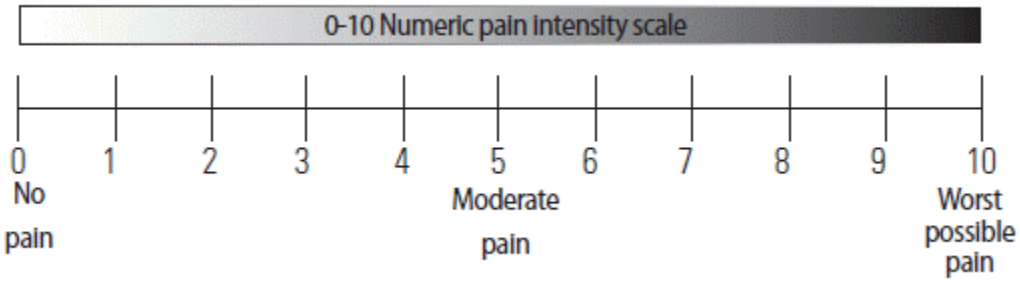
Total Score: _____/80 = _____% physical function

MEDICARE PATIENTS ONLY
100% - _____% Function = _____% Impairment

Patient Signature: _____ Date: _____

Therapist Signature: _____ Date:_____

329 Appendices 2. Numeric Pain Rating Scale



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